E. R. KAST.

SIGNATURE GATHERER.

APPLICATION FILED AUG. 31, 1912.

1,177,524.

Patented Mar. 28, 1916.

6 SHEETS—SHEET 1.

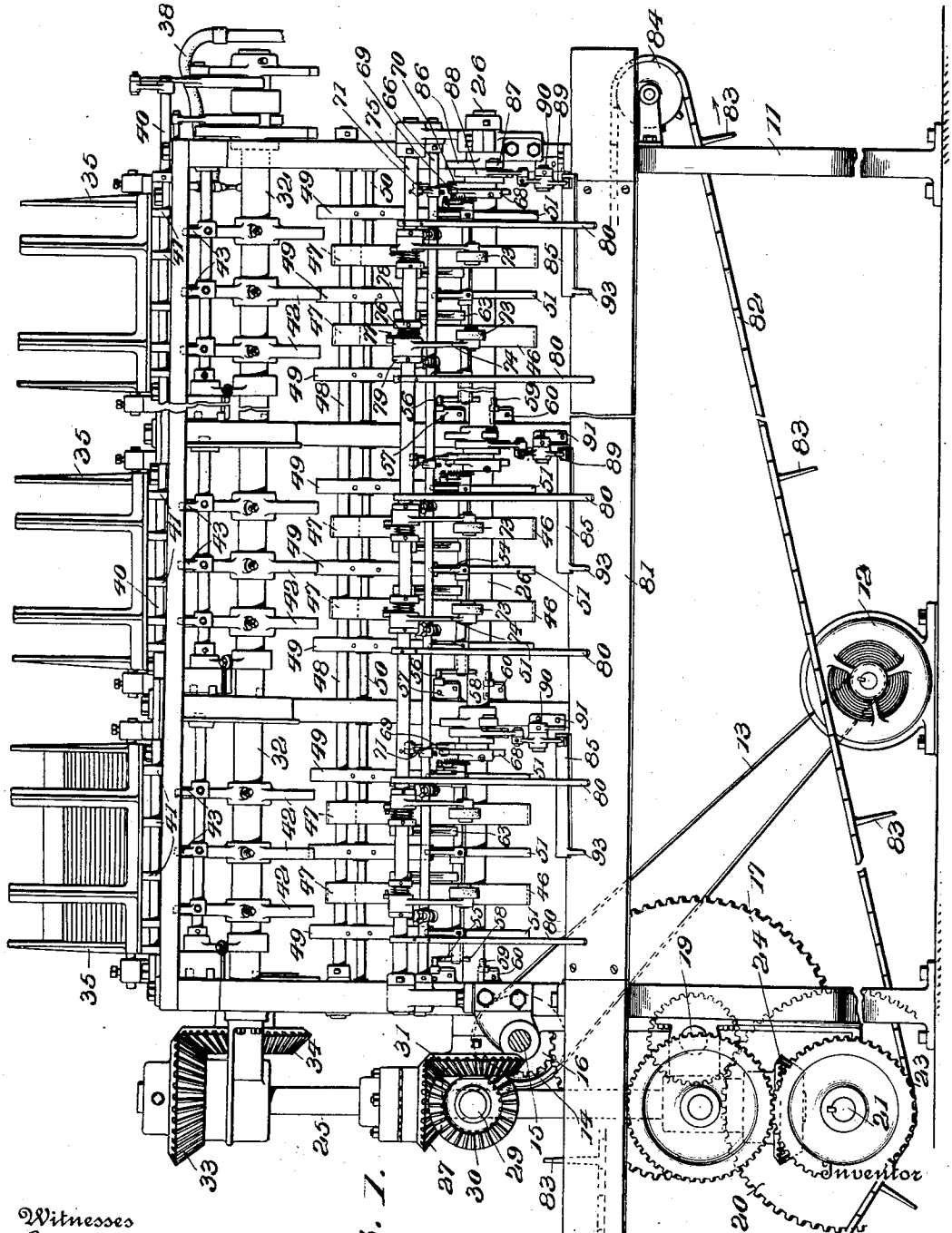


Fig. 1.

Witnesses

R. B. Ketcham.

R. C. Fitzhugh.

Inventor

Edward R. Kast.

By Mauro, Cameron, Lewis & Massie.

Attorney.

E. R. KAST.

SIGNATURE GATHERER.

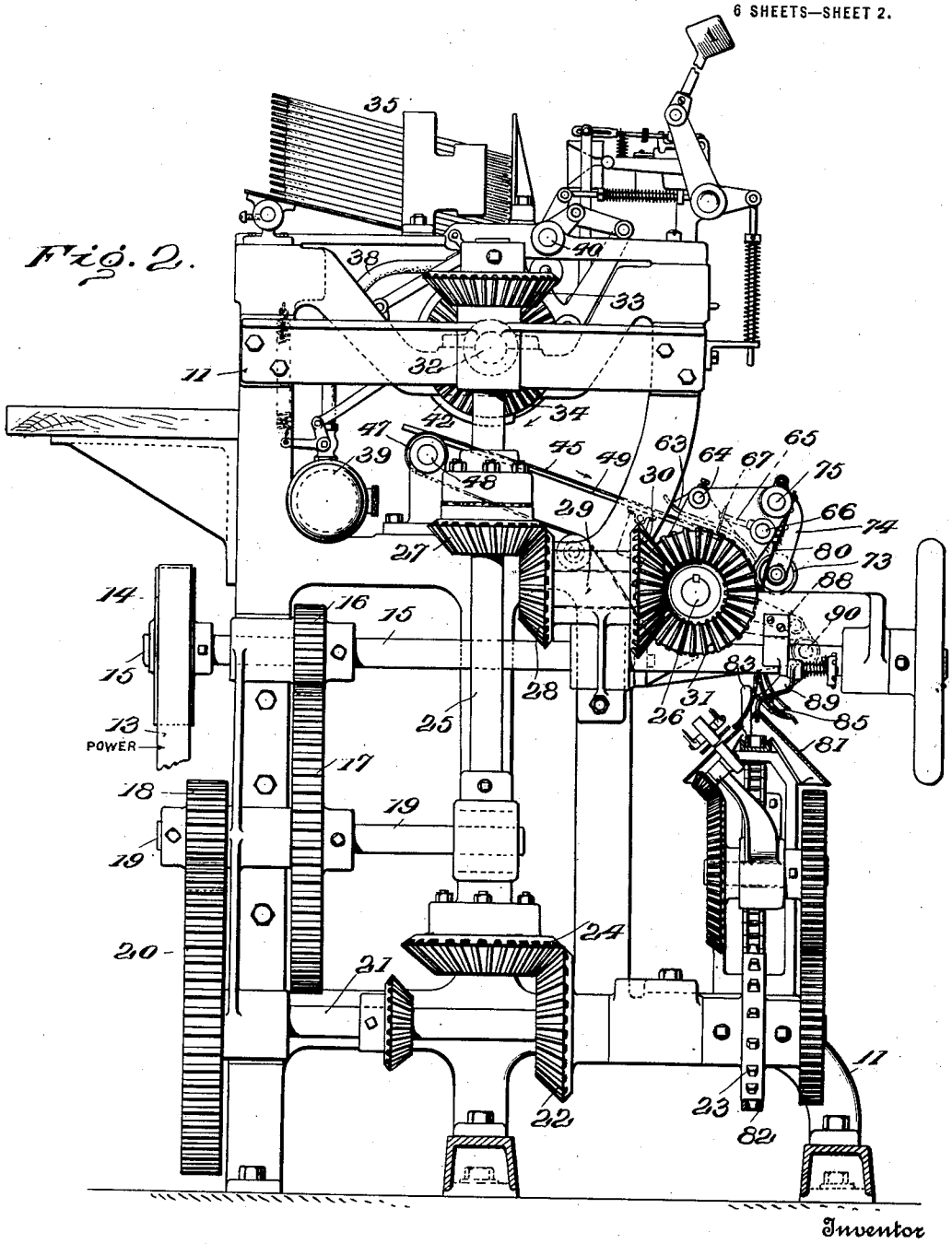
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6 SHEETS—SHEET 2.

Fig. 2.



Inventor

Witnesses

H. B. Kerkam

R. C. Fitzhugh.

Edward R. Kast,

By Mauro, Cameron, Lewis & Massie

Attorneys

E. R. KAST.

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6 SHEETS—SHEET 3.

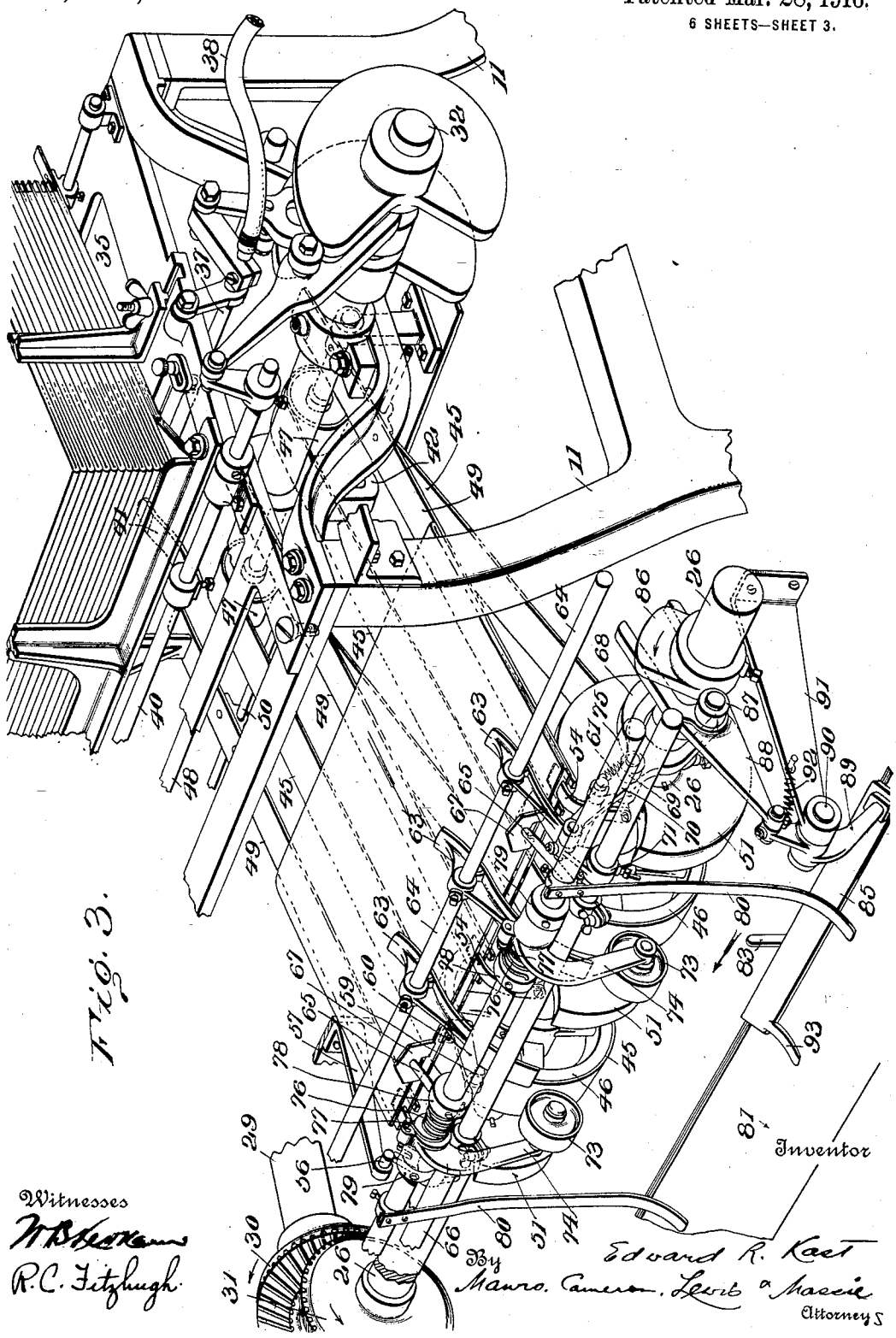


FIG. 3.

Witnesses

W. B. Stevens

R. C. Fitzhugh.

Inventor

Edward R. Kast

By Munro, Cameron, Lewis & Massie

Attorneys

E. R. KAST.

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6 SHEETS—SHEET 4.

Fig. 7.

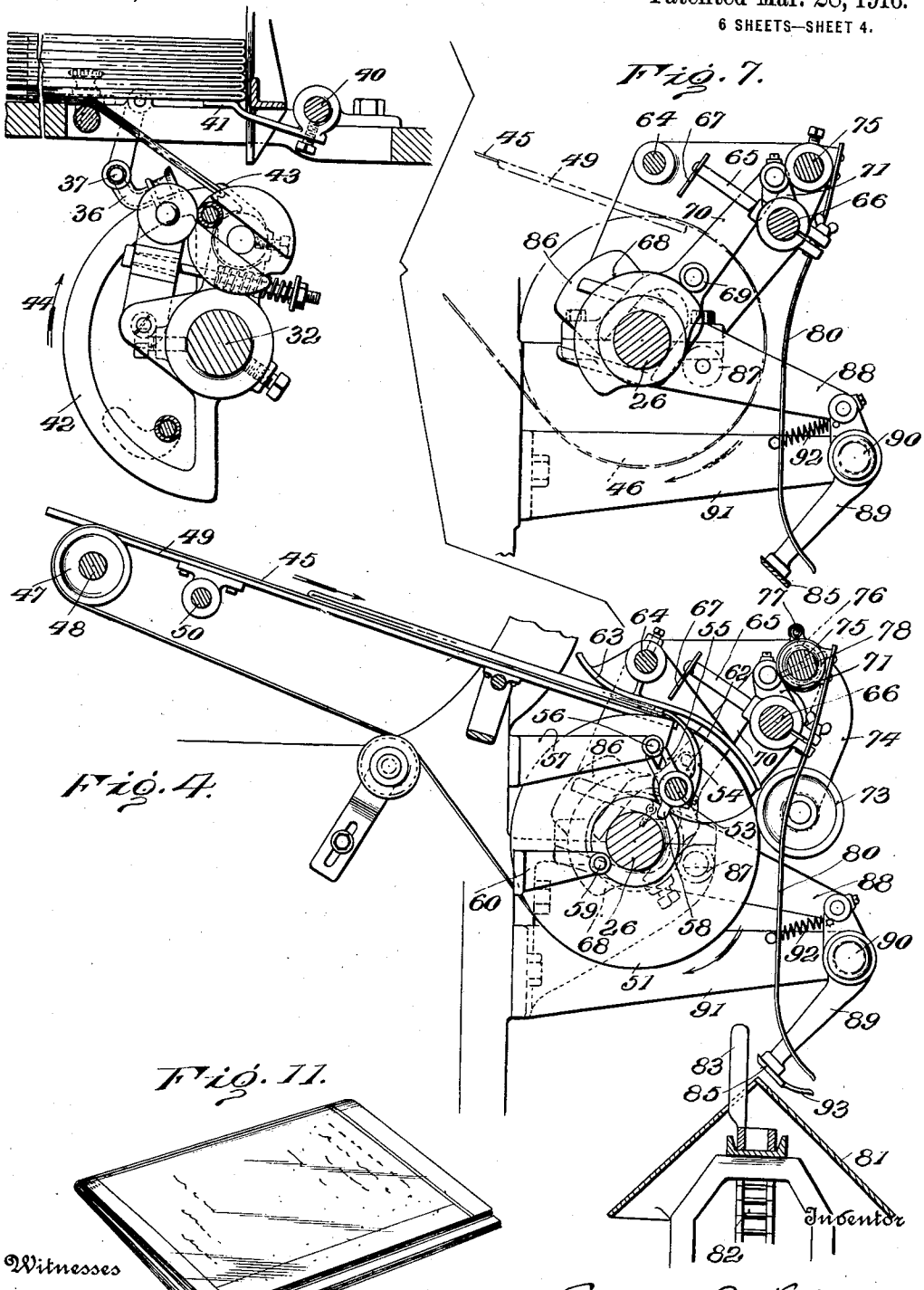


Fig. 4.

Fig. 11.

Witnesses

H. B. Kerran.

R. C. Fitzhugh.

Inventor

Edward R. Kast.

By Mauro, Cameron, Lewis & Massie

Attorneys

E. R. KAST.

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6 SHEETS—SHEET 5.

Fig. 5.

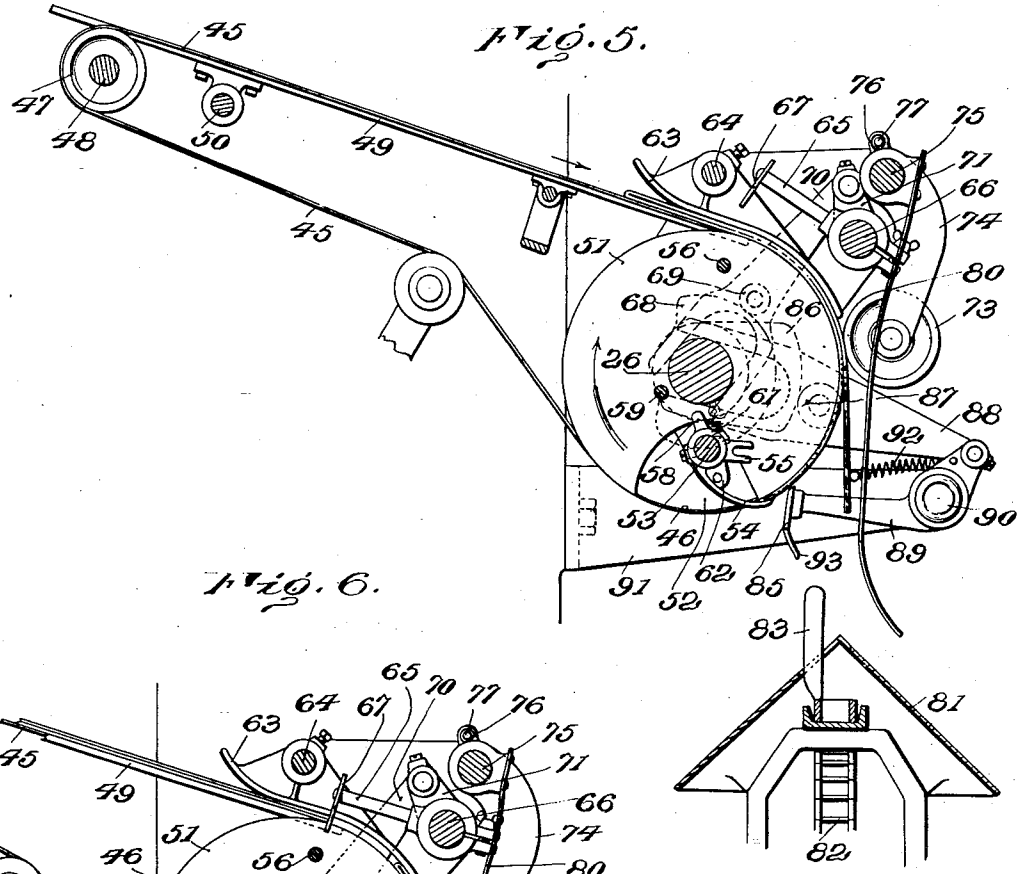
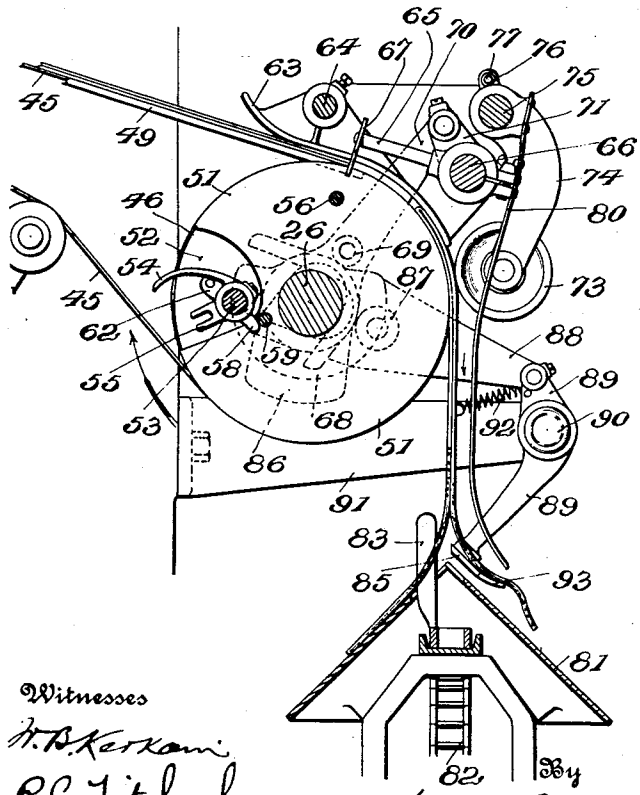


Fig. 6.



Witnesses

H. B. Kerkam

R. C. Fitzhugh

Inventor

Edward R. Kast.

By Mauro, Cameron, Lewis & Chassis

Attorneys

E. R. KAST.

SIGNATURE GATHERER.

APPLICATION FILED AUG. 31, 1912.

1,177,524.

Patented Mar. 28, 1916.

6 SHEETS—SHEET 6.

Fig. 8.

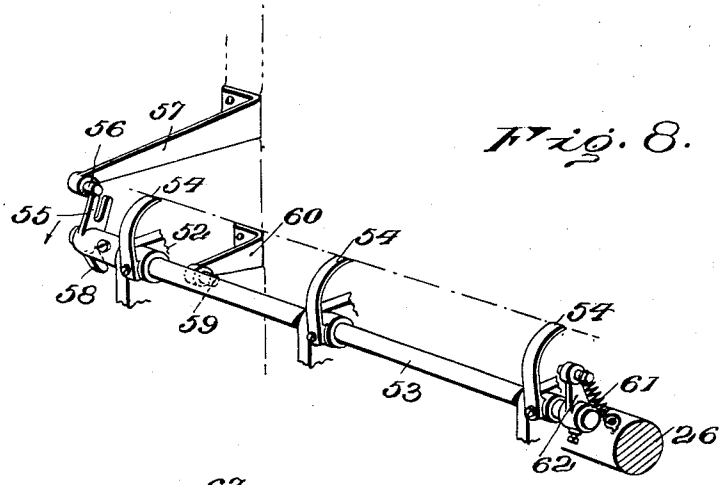


Fig. 9.

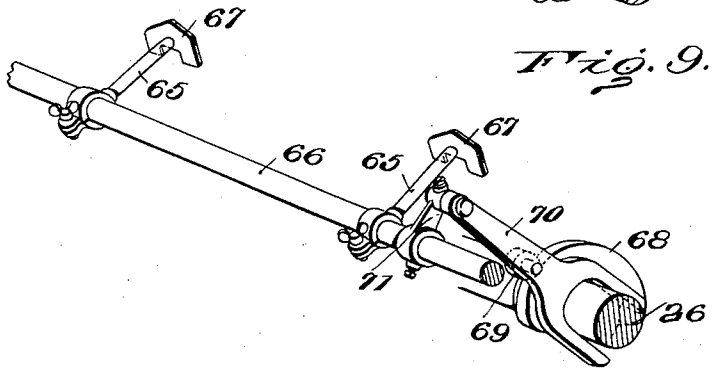
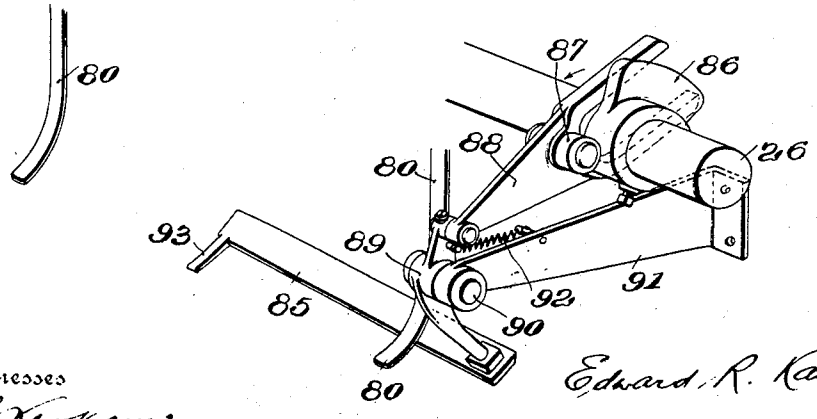


Fig. 10.



Witnesses

H. B. Kerkam

R. C. Fitzhugh

Inventor

Edward R. Kast,

By

Mauro, Cameron, Lewis & Massie

Attorneys

UNITED STATES PATENT OFFICE.

EDWARD R. KAST, OF BALTIMORE, MARYLAND, ASSIGNOR TO KAST INSETTING AND GATHERING MACHINE COMPANY, A CORPORATION OF DELAWARE.

SIGNATURE-GATHERER.

1,177,524. Specification of Letters Patent. Patented Mar. 28, 1916.

Application filed August 31, 1912. Serial No. 718,063.

To all whom it may concern:

Be it known that I, EDWARD R. KAST, of Baltimore, Maryland, have invented a new and useful Improvement in Signature-Gatherers, which invention is fully set forth in the following specification.

The present invention is an improvement in machines for assembling signatures, and particularly is an improvement in insetting machines of the general type set forth in my applications Serial No. 508,160, filed July 17th, 1909, and Serial No. 712,315, filed July 30th, 1912; and the particular object of the present invention is to provide a device that will successfully handle the signatures printed on a web press. These signatures have what are known as "cut heads," that is to say, they are simple signatures folded only along one edge, and frequently a plurality of these signatures will issue from such a press inset one within another. Frequently, too, the capacity of such a press is limited, and it is desired to inset within the other signatures a signature or signatures printed on another press and also to inset the whole within the cover.

One of the objects of the present invention is to provide a machine which will effectively handle a plurality of simple signatures inset one within another, so that they may in turn have additional signatures inset therein and the whole inset within the cover or backing. Prior to my present invention, this work was done by hand; and, in order that the plurality of simple signatures issuing from the web press might be expeditiously opened to have an additional signature or signatures inset therein, one fold of each of said simple signatures was made slightly longer than the other, said projecting part being subsequently cut off to make both folds of each signature the same size. By the present invention, one fold only of each signature is gripped (preferably by said projecting part) by suitable mechanism carried by a rotary element, said gripped folds being thus carried around said rotary element and over one side of the saddle while the other folds of the signatures are engaged by a movable member that guides them over the other side of the saddle. At the proper time the gripping mechanism releases the gripped folds and the signatures drop onto the saddle along which they are advanced by the usual conveyer.

It is frequently desirable to provide a plurality of hoppers some containing single simple signatures or signatures provided with a plurality of right-angle folds while others contain simple signatures already inset one within another as they come from the web press. In such a case it will be readily appreciated that the opening mechanism of my application Serial No. 508,160 might be employed for the single simple signatures or the signatures provided with right-angle folds, in association with the mechanism hereinafter described. Or, if compound signatures having parallel folds were to be inset in the product of a web press, the opening mechanism of my application Serial No. 712,315 might be employed in association with the mechanism of the present application.

Whatever kind of signature or group of signatures are to be inset, it will be understood that the machine of the present invention will effectively handle them, provided one fold of each signature is slightly longer than the other fold so that said projecting part may be gripped by the means hereinafter described.

The invention will be better understood by reference to the accompanying drawings, illustrating one expression of the inventive idea, and wherein—

Figure 1 is a side elevation of an insetting machine provided with three sets of opening mechanisms capable of handling the product from a web press; Fig. 2 is an end elevation thereof; Fig. 3 is a perspective illustrating one of said opening mechanisms and associated parts; Fig. 4 is a side view, partly in section, of one of said opening mechanisms and its associated parts, the gripping means having just gripped the projecting part of one of the folds of a signature; Fig. 5 is a similar view showing the separating, supporting and guiding member for the folds that are not gripped, in its uppermost position; Fig. 6 is a similar

view, the signatures having been released by the gripping mechanism and the separating, supporting and guiding device being in its lowermost position; Fig. 7 is a similar view illustrating more clearly the cam mechanism for operating the alining fingers and the supporting and guiding device; Fig. 8 is a detail perspective view of the gripping fingers and their mounting; Fig. 9 is a detail perspective view of the alining fingers and associated parts; Fig. 10 is a detail perspective of the supporting and guiding device or blade and the means for operating the same; and Fig. 11 is a view of a group of signatures as they come from a web press.

Referring to the drawings, wherein similar letters of reference indicate like parts, 11 is the frame of the machine of any suitable or desired construction. Any suitable means may be employed for supplying power to the machine, which means are shown in the form of an electrical motor 12 driving belt 13 which acts, through a pulley 14 and shaft 15, to drive a pinion 16 which in turn acts through gear 17 and pinion 18, (see Fig. 2) on countershaft 19, to drive a gear 20 on shaft 21. A bevel gear 22 and a sprocket 23 are keyed to said shaft 21. The bevel gear acts, through bevel gear 24, to drive the upright shaft 25 which in turn propels horizontal shaft 26, through the medium of bevel gears 27 and 28, shaft 29 and bevel gears 30 and 31, the latter being mounted on said horizontal shaft 26. Horizontal shaft 32 is also driven from upright shaft 25 through the medium of bevel gears 33 and 34.

Mounted on top of the frame are a series of signature-receiving hoppers or supports 35, in which the signatures are placed, and immediately under each hopper is its associated signature-withdrawing mechanism, consisting of suckers 36 mounted on hollow rock shaft 37, which shaft is connected by pipe 38 with the suction pipe 39, which latter pipe is connected in any suitable manner with an exhaust, not shown. Mounted in the framework of the machine immediately in front of the hoppers is the rock shaft 40 bearing the signature-supporting fingers 41, which support the folded forward edges of the signatures in the hoppers when the suckers 36 are lowered.

Under the respective hoppers on the shaft 32 are mounted a series of signature-withdrawing devices 42, which seize the folded edges of the signatures when they are lowered by the suckers and withdraw the bottom signature, or plurality of inset signatures—if the product of a web press is being handled—from the bottom of the pile. A group of inset signatures as the same comes from a web press is illustrated in Fig. 11, and it is to be understood that when reference is hereafter made to "a signature", this term is also to be interpreted as broad supported while being carried to the signatures.

The withdrawing devices are in the form of semi-cylindrical surfaces keyed to the shaft 32 and provided with a suitable clamping surface against which the signatures are clamped by fingers 43 for withdrawing the same from the hoppers. These withdrawing devices revolve in the direction indicated by the arrow 44, Fig. 4, and when the signature, or group of inset signatures, has been entirely withdrawn from the hopper and carried to the proper position, it is automatically released by the withdrawing devices and advanced to the opening mechanism.

The preferred form of signature-withdrawing mechanism is that shown in my aforesaid application Serial No. 508,160, and, as the specific construction thereof forms no part of the present invention, it need not be more fully described herein.

The signature, or group of inset signatures, having been withdrawn from the hopper, falls from the signature-withdrawing device onto a plurality of belts 45, here shown as two, driven from pulleys 46 on shaft 26 and passing around pulleys 47 on shaft 48, said belts being driven as indicated by the arrows on Fig. 4. Intermediate said belts, and on either side thereof, are arranged flat, stationary plates or surfaces 49, said surfaces being connected in any suitable manner to rod 50, and affording, with belts 45, an extended surface on which the signature, or group of signatures, is supported while being carried to the signature-opening mechanism.

Mounted on shaft 26, and rotating therewith, is a plurality of disks 51, three being here shown as associated with each hopper, said disks being arranged alternately with pulleys 46. Each of said disks is provided with a cut-out portion 52 (Figs. 4, 5 and 6) through which projects a rod 53 which has bearings in the two pulleys 46. One of these rods is provided for each hopper, and mounted thereon is a gripping finger 54 for each disk 51, said fingers acting to clamp or grip the signature against the surfaces of the disks 51. The fingers 54 are caused to grip the signature by reason of the engagement of a slotted tumbler member 55, mounted on one end thereof, with a projection 56 on a bracket 57 suitably secured to the framework of the machine (see Fig. 8); and said fingers 54 are moved to release the signature at the proper time by the engagement of finger 58, also preferably secured to one end of rod 53, with a projection 59 likewise secured to a bracket 60 on the machine frame (see Fig. 4). In order that the operation of these fingers, either to grip or to release the signature, may be

quick and positive, a spring 61 is secured at one end to an arm 62 provided on one end of rod 53, the other end of said spring being secured to shaft 26. This spring is mounted centrally of arm 62 so that its power will be applied as soon as said arm is moved in one direction or the other.

As the signature is carried by the belts 45 toward said gripping fingers 54, it passes under a plurality of guides (here shown as three) 63 which are suitably secured to a stationary rod 64 mounted in the frame of the machine, said guides being curved to conform generally to the shape of pulleys 46 and disks 51, and acting to maintain the signature smooth and in its best condition to be gripped by fingers 54. Further, in order that the signature, or group of signatures, if the product of a web press is being handled, may be properly alined for the engagement of the gripping fingers, an alining means is employed. As here shown these means consist of two fingers 65 suitably secured at one end to a rod 66 mounted in the machine frame, and provided at their other ends with stops 67. These alining stops are movable into and out of the path of the signature by any suitable means. As here shown, fingers 65 are oscillated in a vertical plane by a cam 68 mounted on shaft 26, said cam engaging a roller 69 mounted on a forked arm 70 which latter is connected at one end in any suitable manner to an arm 71 mounted on rod 66, the forks or bifurcated members of said arm 70 engaging around shaft 26. The signature after passing said alining means and after being clamped against disks 51 by gripping fingers 54, preferably travels under tension rollers 73 (see Fig. 3), one of which engages each belt 45 as it passes around its corresponding pulley 46. As here shown each roller 73 is mounted on an arm 74 which in turn is carried by a stationary rod 75 mounted in the frame of the machine. One end of a coiled spring 76 is secured to said arm through the intermediary of a pin 77, and the other end of said spring is secured to a collar 78 capable of adjustment axially of said rod. A collar 79 is secured on said rod 75 on the other side of said arm 74 to prevent movement thereof longitudinally of said rod in that direction. There is also mounted on said rod 75 a plurality of substantially vertical arms 80, preferably two, that act to prevent the signature after it passes from under tension rollers 73 from falling outward, that is to say, away from disks 51.

As clearly appears from the drawings, see particularly Figs. 4 and 11, the signatures to be handled on this machine have one fold slightly longer than the other. Usually the signatures handled by this machine are inset one within another as they come from a web press, and have "cut heads"; that is to say, they are simple signatures which are folded only once, and they are so folded that one fold is slightly longer than the other; but it is to be understood that signatures or groups of signatures of any kind may be handled by this machine so long as one fold of said signature or signatures is provided with a projecting portion that may be gripped. It is this projecting portion of the signature or signatures that is clamped by the gripping fingers against the surfaces of disks 51.

The opened signatures are deposited on an inverted V-shaped saddle 81 which has associated therewith a conveyer 82, provided with pins 83, the said conveyer passing around sprockets 23 and 84 (see Fig. 1). It is unnecessary to describe said parts in greater detail, as they are the same in all substantial respects as the corresponding parts described and illustrated in my application Serial No. 508,160.

In Fig. 4 the gripping fingers 54 are shown just after they have engaged the projecting portion of the longer fold or folds of the signatures, and in Fig. 5 the parts are illustrated in the position which they occupy just before said fingers 54 are moved to release the signature or signatures; and Fig. 6 illustrates the position of the parts just before the folded end of the signature passes from under roller 73.

In order to insure that the shorter fold or folds of the signature or signatures shall be moved into proper relationship with that face of the V-shaped saddle on which they are to rest, a supporting and guiding element may be provided. As here shown one of these supporting and guiding elements is associated with each hopper and preferably consists of a blade which is elevated to engage and support said shorter fold or folds and depressed to guide said shorter fold or folds into proper position over the saddle. The means for effecting this elevation and depression of said blade 85 consists of a cam 86 which engages a roller 87 mounted on a bifurcated arm 88, one end of said arm 88 being connected to one arm of a bell-crank lever 89 pivoted at 90 to a bracket 91 secured to the frame of the machine. The other arm of said bell crank lever is suitably connected to the blade 85, so that, under the influence of cam 86, blade 85 is oscillated upwardly and downwardly. The blade 85 is elevated against the tension of a spring 92 secured at one end to the upper arm of the bell-crank lever and at its other end to bracket 91.

Inasmuch as it is necessary to have each blade 85 short enough in the direction of movement of conveyer 82 so that the signature or signatures will be removed therefrom by the pins 83 carried by the conveyer

82 before said blade commences its upward oscillation to support and guide the next signature or group of signatures, and inasmuch is it is necessary to so support said signature that the front part thereof which projects beyond the blade will not collapse, said blade 85 is provided at or near its forward end with a laterally-projecting finger 93 which acts to effectively support and guide the shorter fold or folds of the signature or signatures over the proper face of the saddle. The operation of this blade 85 is also such that if, for any reason, the shorter fold or folds should adhere to the longer fold or folds, that are clamped by the gripping fingers 54, said blade 85 will effectively and promptly separate them before the gripping fingers 54 are moved to release the clamped folds, the completion of the upward movement of said blade (see Fig. 5) being timed so that it will engage the projecting part of the longer fold of the signature or the longer fold of the innermost signature—if the product of a web press is being handled—just in front of the shorter fold or folds, thus preventing the latter from further participating in the movement of the longer folds around said disks 51.

The operation of the device is as follows: The hoppers being provided with any suitable signatures so folded that one flap is provided with a projecting portion, and said signatures being arranged in said hoppers singly one on top of the other, or in groups—for example, each group being made up of a number of inset signatures such as they issue from a web press—the withdrawing mechanism acts to remove the lowermost signature or group of signatures from the hopper, the gripping fingers 43 of said withdrawing mechanism clamping the folded edge of said signature or signatures. The signature or signatures are released by the withdrawing mechanism, so that it or they fall upon the running tapes 45 which carry them under guides 63, with the open edges of said signature or signatures foremost. At this time the alining stops 67 are in the path of movement of the signature and the latter contacting therewith are promptly straightened out, the forward edge thereof being so alined that each of the gripping fingers 54 will engage the projecting portion of the longer fold or folds to the same extent. After alining the signature, said stops 67 are elevated under the influence of cam 68 and, by reason of the engagement of the tumbler 55 with projection 56, the gripping fingers 54 are rocked into gripping engagement with the projecting portion of the longer fold of said signature, as shown in Fig. 4. The continued rotation of said disks 51 brings the signature to the position indicated in Fig. 5, at which time the oscillating blade 85 has just completed its upward movement under the influence of cam 86. This blade 85 engages the longer fold of the signature just in front of the shorter fold and thus insures the opening of the folds and prevents the shorter fold from adhering to the longer fold. At this time the roller 87 has passed off of the high part of the cam 86 and accordingly the blade 85 oscillates downwardly during which movement it supports said shorter fold and guides the same into proper position over the saddle. After the folded edge of the signature passes out from under tension roller 73, the presence of guide 80 insures that the upper part of the signature will not fall outwardly in a direction away from the disks 51. The signature is removed from the blade 85 by the pins 83 carried by conveyer 82, and said blades must be sufficiently short to permit the signature to be removed therefrom by the pin 83 before said blade 85 commences its next upward oscillation. The conveyer carries the signatures deposited upon the saddle from one hopper to receive those deposited from the next, and so on through the machine. This operation is repeated for each signature or group of signatures, the alining stops 67 and blade 85 oscillating vertically, and said stops moving back in the path of the signatures as soon as the preceding signature has passed.

If the entire machine is handling the product of web presses, or single or groups of signatures one fold of which is provided with a projecting portion which may be gripped by fingers 54, then the mechanism associated with each signature may be identical and the same as that above described. It is, however, obvious that, if desired, one hopper might be equipped with the mechanism above described for handling signatures one fold of which is longer than the other, another hopper might be furnished with mechanism such as described in my application Serial No. 508,160, for handling simple signatures, or signatures having right-angle folds, and a third hopper might be furnished with the mechanism such as described and claimed in my application Serial No. 712,315 for handling signatures having parallel folds. It is equally obvious that a machine of any size might be made up of any desired number and combinations of the mechanism herein described and those described in my said applications Serial Nos. 508,160 and 712,315.

By fold or leaf is meant that part of the product which lies on each side of the fold line, whether there be a single or a number of thicknesses of paper.

As will be apparent, the invention is not restricted to the particular structural embodiment thereof illustrated and described,

but is susceptible of a variety of embodiments conforming to the definition of the invention given in the claims which follow.

What is claimed is:—

1. In a machine for opening signatures, one leaf or fold of each of which projects beyond the other leaf, the combination of a support down which the signatures are fed open edge foremost, signature-opening mechanism engaging the projecting portion of the leaf and separating it from the other leaf, and a support on which the opened signatures are deposited.

2. In a machine for opening signatures, one leaf or fold of each of which projects beyond the other leaf, the combination of a support down which the signatures are fed open edge foremost, signature-opening mechanism grasping the projecting portion of the leaf and separating it from the other leaf, and a support on which the opened signatures are deposited.

3. In a machine for opening signatures, one leaf or fold of each of which projects beyond the other leaf, the combination of an inclined support down which the signatures are fed open edge foremost, signature-opening mechanism grasping the projecting portion of the leaf and separating it from the other leaf, and a support on which the opened signatures are deposited.

4. In a machine for opening signatures, one leaf or fold of each of which projects beyond the other leaf, the combination of a support down which the signatures are fed open edge foremost, rotary signature-opening mechanism engaging the projecting portion of the leaf and separating it from the other leaf, and a support on which the opened signatures are deposited.

5. In combination, a hopper for signatures, means withdrawing signatures from said hopper, a saddle, means gripping one fold only for each signature, means guiding the other fold over the saddle, and means alining said signatures for engagement by said gripping means.

6. In combination, a hopper for signatures, a saddle, means withdrawing signatures from said hopper, means gripping one fold only of each signature, means supporting and guiding the other fold over the saddle, and means alining said signatures for engagement by said gripping means.

7. In combination, a hopper for signatures, a saddle, means withdrawing signatures from said hopper, means gripping one fold only of each signature, means separating the other fold and guiding it over the saddle, and automatically operating means alining said signatures for engagement by said gripping means.

8. In combination, a hopper for signatures, a saddle, means withdrawing signatures from said hopper, means gripping one fold only of each signature, means separating the other fold and supporting and guiding it over the saddle, and automatically operating means alining said signatures for engagement by said gripping means.

9. In combination, a hopper for signatures, means withdrawing signatures from said hopper, a saddle, automatically-operating rotary means gripping one fold only of each signature, and automatically operating oscillating means guiding the other fold over the saddle.

10. In combination, a hopper for signatures, means withdrawing signatures from said hopper, a saddle, automatically operating rotary means gripping one fold only of each signature, and automatically operating oscillating means supporting and guiding the other fold over the saddle.

11. In combination, a hopper for signatures, means withdrawing signatures from said hopper, a saddle, automatically operating rotary means gripping one fold only of each signature, and automatically operating oscillating means separating the other fold and supporting and guiding the same over the saddle.

12. In combination, a hopper for signatures, means withdrawing signatures from said hopper, a saddle, means gripping one fold only of each signature, means guiding the other fold over the saddle, and pivoted means alining said signatures for engagement by said gripping means.

13. In combination, a hopper for signatures, means withdrawing signatures from said hopper, a saddle, means gripping one fold only of each signature, means guiding the other fold over the saddle, and cam-operated pivoted means alining said signatures for engagement by said gripping means.

14. In combination, a hopper for signatures, means withdrawing signatures from said hopper, a saddle, pivoted means gripping one fold only of each signature, pivoted means supporting and guiding the other fold over the saddle, and pivoted means alining said signatures for engagement by said gripping means.

15. In combination, a hopper for signatures, means withdrawing signatures from said hopper, a saddle, withdrawing mechanism for said signatures, pivoted means gripping one fold only of each signature, cam-operated pivoted means guiding the other fold over the saddle, and cam-operated pivoted means alining said signatures for engagement by said gripping means.

16. In combination, a plurality of hoppers for signatures, one leaf or fold of each signature projecting beyond the other, signature-withdrawing mechanism for each hopper, means gripping the projecting portion of said leaf or fold and separating it from

the other leaf or fold, and signature-receiving and progressing means on which the opened signatures are deposited.

17. In combination, a signature-receiving saddle, a plurality of hoppers for signatures, withdrawing mechanism associated with each, means gripping one fold only of each signature withdrawn from said hoppers, means carrying said signatures from said withdrawing to said gripping means, means guiding the other fold over the saddle, means alining said signatures for engagement by said gripping means, and conveying means moving said signatures along said saddle.

18. In combination, a signature-receiving saddle, a plurality of hoppers for signatures, withdrawing mechanism associated with each, means gripping one fold only of each signature withdrawn from said hoppers, means carrying said signatures from said withdrawing to said gripping means, means supporting and guiding the other fold over the saddle, means alining said signatures for engagement by said gripping means, and conveying means moving said signatures along said saddle.

19. In combination, a signature-receiving saddle, a plurality of hoppers for signatures, withdrawing mechanism associated with each, means gripping one fold only of each signature withdrawn from said hoppers, means carrying said signatures from said withdrawing to said gripping means, means separating the other fold from the gripped fold and supporting and guiding the same over the saddle, means alining said signatures for engagement by said gripping means, and conveying means moving said signatures along said saddle.

20. In combination, a hopper for signatures, means for withdrawing signatures from said hopper, means for opening said signatures, and means alining said signatures for engagement by said opening means, said alining means being movable into and out of the path of movement of said signatures.

21. In combination, a hopper for signatures, means for withdrawing signatures from said hopper, means for opening said signatures, a saddle, and an automatically-operated oscillating blade for supporting and guiding one fold of each signature over said saddle.

22. In combination, a hopper for signatures, means for withdrawing signatures from said hopper, means for opening said signatures, automatically-operated oscillating fingers for alining said signatures for engagement by said opening means, a saddle, and an automatically-operated oscillating blade for supporting and guiding one fold of each signature over said saddle.

23. In combination, a hopper for signatures having one leaf or fold projecting beyond the other, means withdrawing signatures from said hopper, means gripping the projecting portion of said fold and separating the same from the other fold, and a support on which the opened signatures are deposited.

24. In combination, a hopper for signatures having one leaf or fold projecting beyond the other, means withdrawing signatures from said hopper, means gripping the projecting portion of said fold and separating the same from the other fold, a support on which the opened signatures are deposited, and means for progressing the signatures along said support.

25. In combination, a plurality of hoppers for signatures having one leaf or fold projecting beyond the other, means associated with each hopper for withdrawing signatures therefrom, means gripping the projecting portion of said fold and separating the same from the other fold, a support on which the opened signatures are deposited, and means for progressing the signatures along said support.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

EDWARD R. KAST.

Witnesses:
E. H. McLACHLEN,
W. B. KERKAM.